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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/074,534

02/11/2002

Michael A. Todd

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10/04/2004

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EXAMINER

RAO, SHRINIVAS H

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/074,534

Applicant(s)

TODD, MICHAEL A.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 16-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-15 and 20-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/28/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### ***DETAILED ACTION***

#### ***Priority***

Receipt is acknowledged of paper submitted under 37 CFR 1.114 claiming priority from U.S. Serial No. 10/074,534 filed on February 11, 2002 which itself claims priority under 35 U.S.C. 119(e) from provisional U.S. Patent Application Numbers 60/268,337 filed on February 12, 2001; 60/279,256 filed on March 27, 2001; 60/311,609 filed on August 9, 2001; 60/323649 filed on September 19, 2001; 60/332,696 filed on November 11, 2001; 60/333,724 filed on November 28, 2001 and 60/340,454 filed on December 07, 2001 which papers have been placed of record in the file.

#### ***Request for Continued Examination Application***

The request filed on 06/28/2004 for a Continued Prosecution Application (RCE) under 37 CFR 1.114 based on parent Application No. 10/074,534 is acceptable and a RCE has been established. An action on the RCE follows.

#### ***Drawings***

The drawings filed on 02/11/02 have been accepted by the Draftsperson.

#### ***Information Disclosure Statement***

Acknowledgment is made of receipt of applicant's Information Disclosure Statement (PTO-1449) filled on June 28, 2004 (Four Sheets of Form PTO-1449 (i.e. first sheet containing a single US published Application reference only; second sheet containing 3 US Patents as references only; third sheet containing 4 US Patents, 1

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Foreign patent references and 1 journal reference; and fourth sheet containing 6 journal articles as references only.

The references on PTO 1499 submitted on 05/14/2002 are acknowledged. All the cited references have been considered.

However the foreign patents and documents cited by applicant are considered to the extent that could be understood from the abstract and drawings.

The contract employees have been instructed to include a copy of the initialed PTO-1449 along with this Office Action.

### ***Preliminary Amendment Status***

Acknowledgment is made of entry of preliminary amendment filed 06/28 / 2004. Therefore claims 1 to 15 and 20-33 as recited in the preliminary amendment are currently pending in the application.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) The invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 to 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Howe et al. (U.S. Patent No. 6,210,988, herein after Howe).

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With respect to claim 1 Howe describes a process for depositing a non-single crystalline SiGe- containing material onto a surface, comprising: providing a chemical vapor deposition chamber having disposed therein a substrate; introducing a gas comprised of a higher-order silane and a germanium precursor to the chamber (Howe col. 5 lines 9-12) and depositing a non-single crystalline SiGe-containing onto the substrate. (Howe col.5 lines 10-15)

With respect to claim 2 Howe describes the process as claimed in Claim 1, wherein the higher-order silane is selected from the group consisting of disilane, trisilane and tetrasilane. (Howe col.5 line 11).

With respect to claim 3 Howe describes the process ms claimed in claim 1, wherein the germanium precursor is selected group consisting of germane, digermane, trigermane and tetragermane. (Howe col. 5 line 9)

With respect to claim 5 Howe describes the process as claimed in Claim 1, wherein the non-single crystalline SiGe -containing film is polycrystalline and the depositing is carried out at a temperature in the range of about 550 ° C to about 700° C. (Howe col. 5 line 11 and col. 5 line 14-15 650 or less)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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With respect to claim 7 Howe describes the process as claimed in Claim 1, wherein the depositing is carried out at a rate of about 50 A per minute or higher. ( Rolfson col. 5 lines 30-31)

With respect to claim 8 Howe describes the process as claimed in Claim 1, wherein the depositing is carried out at a rate of about 100 A per minute or higher. . ( Rolfson col. 5 lines 30-31)

With respect to claim 9 Howe describes the process as claimed in Claim 1, wherein the gas further comprises one or more compounds selected from the group consisting of monosilylmethane, disilylmethane, trisilylmethane, tetrasilylmethane, and a dopant precursor. ( Rolfson col. 4 lines 34-54).

With respect to claim 10 Howe describes the process as claimed in Claim 1, wherein the chemical vapor deposition chamber is a Single-wafer, horizontal gas low reactor. ( Rolfson col. 1 lines 44-56).

**B.** Claims 11-15 , 20-33 and are rejected under 35 U.S.C. 103(a) as being unpatentable over by Howe et al. ( U.S. Patent No. 6,210,988, herein after Howe) in view of Rolfson over Rolfson ( U.S. Patent No. 5,786, 027, herein after Rolfson, also cited by the applicants' in their IDS) as applied to claims above and further in view of U'Ren ( U.S. Patent No 6,365,479 herein after U'Ren)

With respect to claim 11 Howe describes the process as claimed in Claim 1, wherein the SiGe-containing film has a thickness non-uniformity of about 10% or less.

Howe and Rolfson both describe SiGe containing films of uniform thickness without specifying the non-uniformity to be present in the range of 10 % or less .

Claims 4 and 6 to 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Howe et al. ( U.S. Patent No. 6,210,988, herein after Howe) as applied to claims 1-3 above and in view of .Rolfson over Rolfson ( U.S. Patent No. 5,786, 027, herein after Rolfson, also cited by the applicants' in their IDS).

With respect to claims 4, Howe describes the process as claimed in Claim 1, wherein the higher-order silane is trisilane and the germanium precursor is germane.

Howe describes higher order silanes without specifically mentioning trisilane.

However Rolfson, a patent from the same field of endeavor describes in col. 2 lines 57 to 67 the use of higher silanes like silane, disilane or tri silane etc. to provide an improved method of depositing films that enable a manufacturer to produce more stable devices with discontinues and randomly oriented grain boundary layers and also random, polycrystalline grain structure.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Rolfson's higher silane namely trisilane in Howe's method . the motivation to make the above substitution is to provide an improved method of depositing films that enable a manufacturer to produce more stable devices with discontinues and randomly oriented grain boundary layers and also random, polycrystalline grain structure. ( Rolfson col. 1 lines 10-15, col. 2 18-27, etc.)

With respect to claim 6 Howe describes the process as claimed in Claim 1, wherein the non-single crystalline SiGe-containing film is amorphous and the depositing is carried out at a temperature in the range of about 450C to about 600C. (Rolfson col.4 line 6 )

However U'ren a patent from the same filed of endeavor describes in col. 6 lines 62-65 , col. 7 lines 60-65 and graphs , etc. describes an important consideration is that the film be conformal and smooth i.e. non-uniformity is less than 10 % , so that the strain between the silicon and silicon –germanium crystals does not exceed the critical level which in turn ensures good control over the desired profiles of the multiplayer collector-base-emitter stack so produced. ( U'Ren col. 4,5 and 6).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include U'Ren's teaching of thickness non-uniformity of about 10% or less in Howe and Rolfson's processes . The motivation to make the above combination is so that the strain between the silicon and silicon –germanium crystals does not exceed the critical level which in turn ensures good control over the desired profiles of the multiplayer collector-base-emitter stack so produced. ( U'Ren col. 4,5 and 6).

With respect to claim 12 describes the process as claimed in Claim 1, wherein the SiGe containing film has greater uniformity than a comparable film made using silane in place of the higher-order silane,( U'Ren abstract line 5)

With respect to claim 13 describes the process as claimed in Claim 1, further comprising patterning the SiGe containing film to form a transistor gate electrode. ( U'Ren abstract line 5).

With respect to claims 14 and 15 Howe describes the process as claimed in Claim 1, wherein the surface is formed by a dielectric film or silicon oxide film . ( U'Ren fig. 1 #110, col. 4 lines 3-4).



With respect to claim 20 Howe describes a process for making a graded SiGe-containing film, comprises: providing a substrate disposed within a CVD chamber; ( Howe col. 5 lines 9-12 ) depositing a graded SiGe-containing onto the substrate by thermal CVD using a deposition gas comprising trisilane and a germanium precursor. ( U'Ren figure 1, col. 3 lines 50 to 60).

With respect to claim 21 Howe describes the process of Claim 20, wherein the amounts are varied to produce a germanium concentration that is a substantially linear function of Ge amount of germanium precursor. ( U'ren figures 2 and 4)

With respect to claim 22 Howe describes the process: of Claim 20. wherein the germanium precursor is selected from the group consisting of germane and digermane. ( U'ren col. 3 line 52).

With respect to claim 23 Howe describes the process of claim 22, wherein the graded SiGe-containing film is deposited at a deposition rate that is a substantially linear function of the amount of germanium precursor. ( U'ren figures 2 and 4)

With respect to claim 24 Howe describes the process of Claim 22, wherein the deposition gas further comprises an amount of silane. ( Howe col.5 line 11-12).

With respect to claim 25 describes the process of Claim 24, wherein the amount of silane is varied during deposition. ( U'ren figure 2, Rolfson col.4 lines 50-55).

With respect to claim 26 describes the process of Claim 24, wherein a weight ratio of trisilane to silane in the deposition gas is about 1:1 or greater. ( U'ren figure 2, Rolfson col.4 lines 50-55).

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With respect to claim 27 Howe describes the process of Claim 24, wherein the weight ratio of trisilane to silane in the deposition gas is about 4:1 or greater. ( U'ren figure 2, Rolfson col.4 lines 50-55).

With respect to claim 28, Howe describes the process of Claim 20, wherein the SiGe-containing film is epitaxial. ( Howe col.1 line 56).

With respect to claim 29, Howe describes the process of Claim 20, wherein the SiGe-containing film comprises carbon. ( U'Ren figure 1, col. 4 line 7).

With respect to claim 30, Howe describes the process of Claim 20, wherein the SiGe-containing film is polycrystalline. ( Howe col.1 line 44).

With respect to claim 31, Howe describes the process of Claim 20, wherein the SiGe-containing film is amorphous. ( U'ren col.10 line 12).

With respect to claim 32, Howe describes the process of Claim 30, wherein the SiGe-containing film is formed directly over a dielectric .( U'ren figure 1).

With respect to claim 33 Howe describes the process of Claim 32, wherein the dielectric comprises silicon oxide. (U'Ren fig. 1 #110, col. 4 lines 3-4).

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-15, 20-33 have been considered but are moot in view of the new ground(s) of rejection.

It is however noted for the record that Applicant Michael A. Todd of last known residence 7041 N. 14 th place, Phoenix, Az 85020 and the sole Applicant herein in his oath/declaration filed for the instant Application on May 24, 2002 stated under oath in

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the specification claims 21 and 23 "wherein the graded SiGe-containing film is deposited at a deposition rate that is a substantially linear function of the amount of germanium precursor." Which claims have been maintained without amendments during the pendency of the application so far .

In direct contrast and the exact opposite position have been declared to under oath in a 132 declaration filed on June 23, 2004 by the same affiant namely the sole inventor Mr. Michael A. Todd of last known residence 7041 N. 14 th place, Phoenix, Az 85020.

" 26. The substantial non-linearity of Ge incorporation over a broad range of Ge concentrations as shown in Figures 5-8 as recognized as a long-standing problem in the art, see Exhibit A (Fig. 2); Exhibit C (Fig. 1); Exhibit E (Fig. 9) and Exhibit F (Fig. 4). For example, Exhibit A at page 3389, column 1, 1ast paragraph, notes that the germane film concentration in the SiGe film is not a linear function of the germane concentration in the gas phase when using either silane or disilane as the silicon source."

Therefore either the application including the claims (when the claims are given their broadest possible meaning) and specification contain a false declaration or the! 32 declaration is false.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272-1718. The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 5:30 p.m.

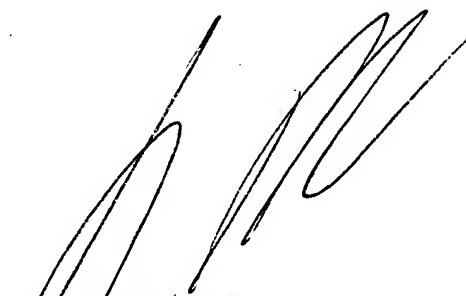
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Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7724.

  
Steven H Rao

Patent Examiner

September 15, 2004.

  
LONG PHAM  
PRIMARY EXAMINER